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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/708,051	02/05/2004	A. John Speranza	PES-0188	2050

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EXAMINER	
MURALIDAR, RICHARD V	
ART UNIT	PAPER NUMBER
2838	
MAIL DATE	DELIVERY MODE
12/14/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/708,051	SPERANZA ET AL.	
	Examiner	Art Unit	
	Richard V. Muralidar	2838	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 September 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-37* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-37* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 May 2005* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This action is in response to the reply received 09/05/2007.

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "**allows selection between a series building block and a parallel building block**" from the newly added claims must be shown or the feature(s) canceled from the claim(s). Currently the drawings only show a paralleled output for the converter modules. No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner,

the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-5, 8-15, and 18-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tracewell et al. [U.S. 6046921] in view of Czajkowski et al. [U.S. 6503649], in further view of Youn et al. [U.S. 2002/0071290].

With respect to claims 1, 11, and 22, Tracewell discloses power electronics for an electrochemical cell system/method [Fig. 19 power electronics; Fig. 17, capacitors 444, col. 12 lines 41-45; the apparatus encompasses the method], the power electronics comprising: a first power converter [Fig. 15, 300] including: a plurality of interchangeable power converter modules [Fig. 15, 250a-g], each of the modules having a predefined power rating [col. 8 lines 55-57]; and a first expandable motherboard [Fig. 15, motherboard 376 is expandable when more converters 252 (Fig. 8) are connected via pins 256/258, as well as when connected to other power supplies 250 via plug-in connectors 267 and 270] configured to receive the plurality of interchangeable power converter modules [co. 11 lines 12-25], to receive three-phase AC input voltage [Fig. 10,

308], and to deliver DC output voltage [Fig. 8, 268, 270; Fig. 19, AC in at 480, DC out at 488]; each of the modules is coupled to the first motherboard to receive AC input voltage therefrom and to deliver DC output voltage thereto [col. 8 lines 51-61; col. 9 lines 46-48; col. 14 lines 8-16; note also col. 1 lines 15-23, either ac-dc or dc-dc converters can be used]; each of the modules have a selectable operating voltage [from 350-380 volts, col. 15 lines 1-8] and a voltage balancing device for providing a series or parallel building block for the first motherboard, thereby further enabling the first motherboard to have an expandable power rating [col. 10 lines 13-26]; wherein a power rating of the first power converter is capable of being changed by adjusting a number of the interchangeable power converter modules attached to the first motherboard [col. 10 lines 23-26]. Tracewell does not disclose an electrochemical cell [i.e. fuel cell] as part of the modular power electronics system.

Czajkowski discloses an electrochemical, variable power supply with scalable, modular power electronics, supplied by a fuel cell [abstract, col. 5 lines 40-58, Fig. 1, electrochemical fuel cell 30].

Tracewell, Czajkowski, and Youn are analogous power supply systems that use converters. Tracewell discloses a modular, scalable, power supply system with an AC source of power. Czajkowski discloses a modular, scalable power supply system with a DC fuel cell source of power. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the two modular systems together into one modular power supply unit; utilizing the AC power source as taught by Tracewell, and the fuel cell power source as taught by Czajkowski, for the benefit of producing a

modular power supply system with TWO sources of power, as taught by Youn [par. 0002; Fig. 2, power supply with AC and DC power sources]. The benefits of having two sources of power are widely known, such as having a universal power supply [Youn-Abstract], as well as increased redundancy and reliability in supplying power to the loads.

With respect to claims 2, 12, and 14, Czajkowski discloses a controller [Fig. 3 controller 20] configured to adjust a current output from the interchangeable power converter modules attached to the first/second motherboard [col. 9 lines 52-56].

With respect to claim 3, Czajkowski discloses a second power converter [Fig. 2 converter system 40 in the second power conversion module 12] including: a second motherboard configured to receive at least a portion of the plurality of interchangeable power converter modules [col. 7 lines 1-6; col. 8 lines 17-19 modular converters 42]; wherein a power rating of the second power converter is capable of being adjusted by changing a number of the interchangeable power converter modules attached to the second motherboard [Figs. 1 and 2; col. 8 lines 13-24; col. 6 lines 56-67 and col. 7 lines 1-6; col. 6 lines 16-21 the overall converter].

With respect to claim 4, Tracewell discloses that the controller is further configured to adjust a current output from the interchangeable power converter modifies attached to the second motherboard and the controller is a single controller configured to adjust a current output from each of the interchangeable power converter modules attached to the first motherboard and from each of the interchangeable power converter modules attached to the second motherboard [col. 11 lines 26-65].

With respect to claims 5, 15, and 26, Czajkowski discloses the first power converter is one of an AC-to-DC converter and a DC-to-DC converter, and the second power converter is one of an AC-to-DC converter and a DC-to-DC converter [col. 8 lines 13-24; modular converter 42 comprised of dc-dc converters].

With respect to claims 8 and 18, Czajkowski discloses the first DC output from the first half-module and the second DC output from the second half-module are controlled by the controller [col. 9 lines 52-56].

With respect to claims 9 and 19, Czajkowski discloses the first motherboard, the second motherboard [with respect to the motherboard/circuit board, it is implicit from Fig. 1 or Fig. 2 that the modules would be implemented in circuit cards given by the dashed outlines of each power conversion module 12 or 13], and the controller are mounted in a common power converter box [a common means of containing all the components are implicit- stand alone unit col. 1 lines 6-9].

With respect to claims 10, 20, and 27, Czajkowski discloses the controller is configured to receive signals from the interchangeable power converter modules attached to the first motherboard, the signals indicating at least one of: an output current, a temperature, a fuse status, an output voltage, an input voltage, and combinations including two or more of the foregoing [electrical parameters, temperature etc. col. 7 lines 15-19].

With respect to claim 13, Czajkowski discloses a second power source [Fig. 1, first source #1 feed; second source #2 feed], wherein the modular power electronics system is electrically connected between the second power source and the

electrochemical cell [Fig. 1, Fuel cell 30]; and wherein the modular power electronics system further includes: a second power converter [42] adapted for conditioning electrical current flow between the second power source and the electrochemical cell, the second power converter including: a second expandable motherboard [col. 5 lines 53-62] configured to receive at least a portion of the plurality of interchangeable power converter modules; wherein a power rating of the second power converter is capable of being adjusted by changing a number of the interchangeable power converter modules attached to the second motherboard [as many converters can be connected together as desired to provide the output power rating].

With respect to claim 21, Czajkowski discloses the controller is in operable communication with a controller for the electrochemical cell [col. 6 lines 30-35 and 49-55; col. 7 lines 38-43].

With respect to claims 23 and 25, Czajkowski discloses configuring a plurality of the interchangeable power converter modules [col. 8 lines 13-24] attached to the first motherboard such that an associated current output is adjustable using a single controller [col. 9 lines 52-56].

With respect to claim 24, Czajkowski discloses, the power electronics are housed within a power converter box and include a second power converter, the method further comprising: configuring the power converter box housing the first motherboard and the single controller such that a second expandable motherboard may be included therein; and configuring the second power converter such that its power rating

is adjustable by changing a number of the interchangeable power converter modules attached to the second motherboard [the limitations of this claim have been addressed by the preceding claim arguments].

With respect to claims 28 and 30, Czajkowski discloses a second power converter including: at least a portion of the plurality of interchangeable power converter modules attached to the first motherboard, wherein a power rating of the second power converter is capable of being adjusted by changing a number of the interchangeable power converter modules attached to the first motherboard [the limitations of this claim have been addressed by the preceding claim arguments].

With respect to claim 29, Czajkowski discloses a second power source, wherein the modular power electronics system is electrically connected between the second power source and the electrochemical cell; and wherein the modular power electronics system further includes: a second power converter adapted for conditioning electrical current flow between the second power source and the electrochemical cell, the second power converter including: at least a portion of the plurality of interchangeable power converter modules attached to the first motherboard, wherein a power rating of the second power converter is capable of being adjusted by changing a number of the interchangeable power converter modules attached to the first motherboard [the limitations of this claim have been addressed by the preceding claim arguments, specifically Claim 13. All the converters modules are interconnected, so specifying which motherboard the modules are attached to does not functionally change the device's ability, as shown in Figs. 1, 2, and 3].

With respect to claim 31, Czajkowski discloses that the electrochemical cell is an electrolysis cell [Abstract; it is known that fuel cells can be either of the electrochemical or electrolysis types; both serve the same purpose- to generate power].

With respect to claim 32, Czajkowski discloses the plurality of interchangeable power converter modules receive a generated grid input voltage from the first motherboard [see statement concerning motherboard in claim 1 and in arguments below. The converters receive power from the fuel cells, which can be on its own motherboard/chassis or combined with that of the converter], and provide programmable output voltage in parallel to the electrochemical cell [the connection between the converters and the fuel cell is parallel, the voltage is programmable through the action of the controller 20 in Fig.1- col. 6 lines 56-68 and col. 7 lines 1-6].

With respect to claim 33, Tracewell discloses that each of the modules are disposed upon a single circuit board [Fig. 15, motherboard 376]; and the first motherboard comprises a filter for filtering the received AC input voltage [Fig. 19, 484].

Claims 6-7, 16-17, and 36-37 are rejected under 35 U.S.C. 103[a] as being unpatentable over the combined references as applied the above claims, in further view of Nomura et al [2001/0012207].

With respect to claims 6 and 16, Czajkowski teaches each power converter module in the plurality of power converter modules includes: a first chopping circuit configured to receive a first DC input and provide a first AC output; a first transformer configured to adjust a power of the first AC output and provide a first transformed AC

output; and a first rectifier configured to receive the first transformed AC output and provide a first DC output. Since Czajkowski anticipates dc-dc converters in col. 8 lines 13-24; all of these components are implicit because dc-dc converter circuitry is well known in the art. However, Czajkowski does not go into any detail concerning the individual converter components.

Nomura teaches a first chopping circuit [Fig. 1 H bridge inverter 58] configured to receive a first DC input and provide a first AC output; a first transformer [Fig. 1 transformer 31] configured to adjust a power of the first AC output and provide a first transformed AC output; and a first rectifier [Fig. 1 rectifying diodes 33-36] configured to receive the first transformed AC output and provide a first DC output.

Czajkowski and Nomura are analogous dc-dc power converters. At the time of the invention it would have been obvious to one of ordinary skill in the art to specify Nomura's dc to ac to dc converter in conjunction with Czajkowski for the benefit of clearly showing the internal workings of Czajkowski's invention. This particular structure for dc to ac to dc converters where the dc input is first inverted, transformed, then rectified again is the standard state of dc to ac to dc converters and is widely known in the art.

With respect to claims 7 and 17, Czajkowski teaches each power converter module in the plurality of power converter modules [col. 8 lines 13-24], and that they consist of smaller modules [Fig. 2 modules #1-n, dc to ac converters], but does not teach the inner components of the modules.

Nomura teaches a first chopping circuit [Fig. 1 H bridge inverter 58] configured to receive a first DC input and provide a first AC output; a first transformer [Fig. 1 transformer 31] configured to adjust a power of the first AC output and provide a first transformed AC output; and a first rectifier [Fig. 1 rectifying diodes 33-36] configured to receive the first transformed AC output and provide a first DC output. The second half module's components are identical to the first.

Czajkowski and Nomura are analogous dc-dc power converters. At the time of the invention it would have been obvious to one of ordinary skill in the art to specify Nomura's dc to ac to dc converter in conjunction with Czajkowski for the benefit of clearly showing the internal workings of Czajkowski's invention. This particular structure for dc to ac to dc converters where the dc input is first inverted, transformed, then rectified again is the standard state of dc to ac to dc converters and is widely known in the art.

With respect to newly added claims 34-37, Czajkowski discloses the recited "a voltage balancing device that allows selection between a series building block and a parallel building block"- [col.4 lines 53-57; col. 6 lines 56-67 and col. 7 lines 1-5; col. 8 lines 13-24; Fig. 3, 40].

Tracewell and Czajkowski disclose the recited "the voltage balancing device is electrically coupled to the first-half module and the second-half module in such a manner as to sense and balance input voltages to the first-half module and the second-half module in response to an input voltage to the first-half module being drawn down in response to the first-half module producing output voltage, which tends to increase

an input voltage to the second-half module [Tracewell- col. 11 lines 12-65; Czajkowski- col. 8 lines 13-24 and 37-67; col. 9 lines 1-10 and 52-56]. All other limitations are treated in the remarks/above.

Response to Arguments

Applicant argues on pages 14 and 15 that Tracewell [US 6046921] does not teach "**to receive AC input voltage from the first motherboard and to deliver DC output voltage to the first motherboard**." This limitation essentially means that the applicant utilizes AC-DC converter modules, connected to the motherboard. Tracewell receives AC into a daughterboard 216 [Fig. 7] which is then transformed and rectified into DC voltage. The DC voltage is then sent to the connected motherboard 170, where it supplies individual DC-DC power converter modules 70a and 70c [Fig. 5], per col. 7 lines 25-34. However, one can just as easily substitute AC-DC converter modules on the circuit board, instead of DC-DC converters, with the requisite modification to the motherboard. **Col. 1 lines 15-23 states that both ac-dc and dc-dc types of converter modules are known and used**. In view of this disclosure and what one of ordinary skill in the art would know, the examiner concludes that it is a simple and obvious matter for one of ordinary skill to substitute ac-dc converter modules supplied by a motherboard, in place of dc-dc converter modules supplied by a motherboard.

Applicant argues on page 16 that Tracewell does not teach the series/parallel limitation of claim 1: "**a voltage balancing device for providing a series or parallel building block for the first motherboard.**" The examiner understands and appreciates

the clarification of how this limitation should be read; specifically that *both* series and parallel building blocks should be present. However, the limitation as written above can still be interpreted as EITHER series OR parallel. The applicant is reminded the examiner is required to make the broadest reasonable interpretation of each limitation in consideration of the references at hand. Additionally, see the comments directed towards the newly added claims above.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard V. Muralidar whose telephone number is 571-272-8933. The examiner can normally be reached on 9:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Akm E. Ullah can be reached on 571-272-2361. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Richard V. Muralidar/
Examiner, AU 2838
8 Dec 2007

BAO Q. VU
PRIMARY EXAMINER